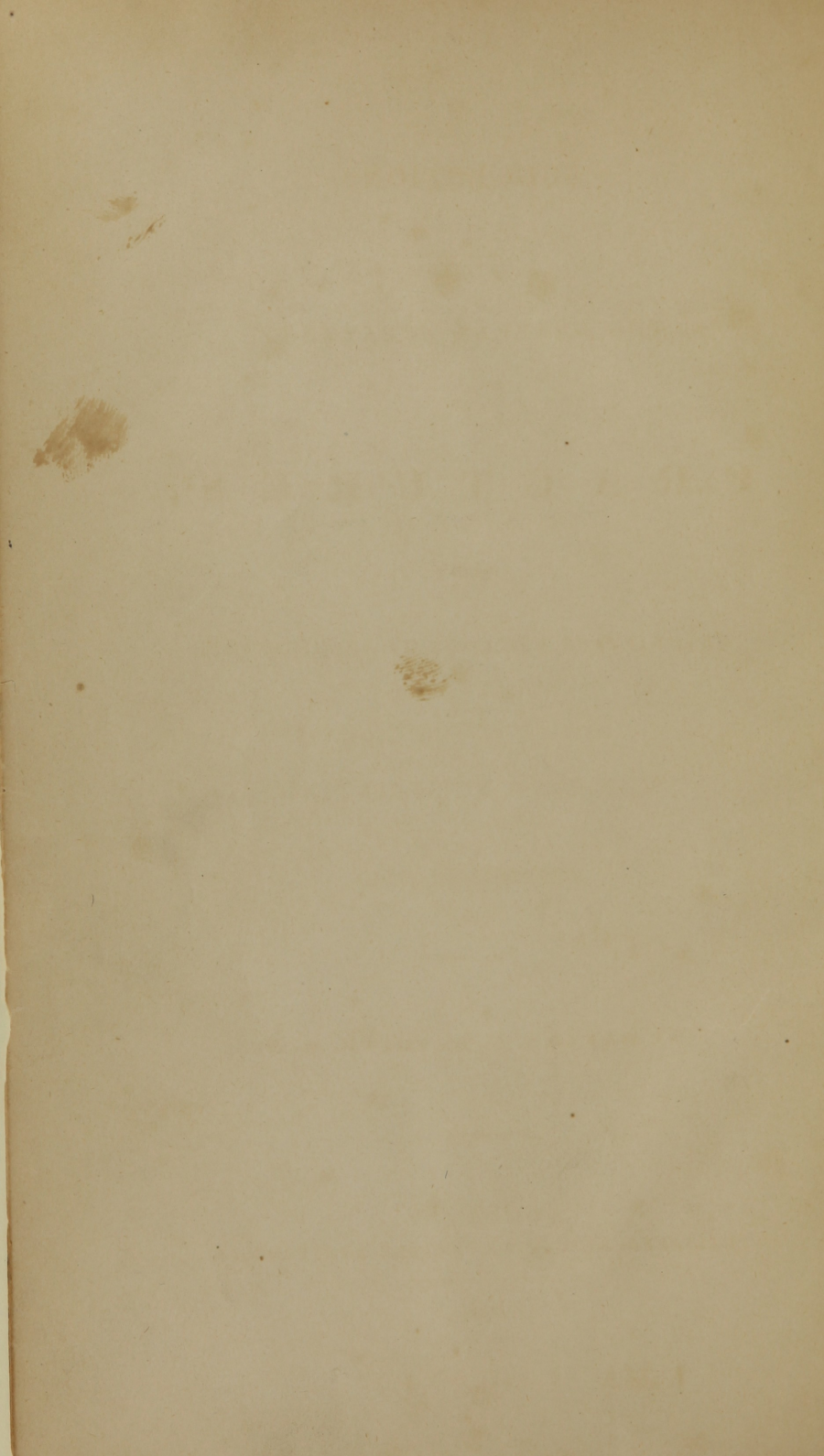


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SMITH. SUGGESTIONS WITH REGARD TO  
THE GENERAL TREATMENT OF FRACTURES.





SUGGESTIONS

WITH REGARD TO

THE GENERAL TREATMENT

OF

*on*  
FRACTURES,

WITH A

DESCRIPTION AND MODE OF APPLICATION,

OF A

NEW KIND OF SPLINTING,

COMPOSED OF FELT.

BY DAVID S. C. H. SMITH, M. D.

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# TREATMENT

OF

# FRACTURES.

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It must have occurred to every practising surgeon, that in fractures of the os-femoris a shortening of the bone almost uniformly takes place. This phenomenon has generally been attributed to the right cause, (viz. a contraction of its large and powerful muscles, particularly the flexors,) but the means to prevent it have been as generally mistaken. Much force has been thought necessary to prevent this contraction of the muscles, and for this purpose pullies and long splints, so applied as to keep the muscles constantly upon the stretch, have been resorted to. But the muscles under the action of these instruments, feeling a kind of sensation as if their fibres were about to be drawn asunder, contract powerfully, and not unfrequently take on a spasmodic action more than sufficient to counterbalance the extending power. The effect of violent extension upon muscles, is clearly illustrated in cases of dislocated shoulder joint. The deltoides, pectoralis and latissimus dorsi are all inserted into the humerus, and contract powerfully whenever an attempt is made to put their fibres upon the stretch ; so much

so, that it frequently becomes necessary to bleed and administer large doses of emetic medicines in order to reduce the vital energies of the system, before the muscles will yield sufficiently to allow the dislocation to be reduced. That this state of the muscular fibre does not exist previous to the application of the extending power, is clearly proved by the fact, that one quarter part of a force which otherwise would have been hardly sufficient to have answered the purpose intended, if applied instantaneously, will replace the head of the bone in its natural situation; and this is precisely the manner in which those quacks in surgery, commonly called natural bone-setters, effect their object, though they are themselves ignorant of the principles upon which their success depends. Now, if it is a fact, that this state of the muscles is produced by putting their fibres upon the stretch, why apply this practice to cases of fracture, especially at a time when the irritability of the muscular fibre is greatly increased by the attending inflammation? The advocates for permanent extension, however, may say that long continued force will overcome this contraction of the muscles, and that they will at length yield the point to the extending power. We will suppose that for the first ten or twelve days the surgeon has been enabled by the use of pullies, splints and bandages to keep the broken ends of the bone in a perfect state of coaptation; let me ask what has he gained? Certainly nothing which will be ultimately useful to the limb; for no one pretends to say that even an effort is made towards a reunion of the broken bone short of about the fourteenth day. His pullies and splints therefore have had no other effect than to cause much unnecessary pain and suffering to the patient, increase the inflammation, and retard the cure.



The muscular contraction, which ultimately causes a permanent shortening of the limb, is one of a totally different character from that which I have described above; the former is a spasmodic action, and being one of high vital character, continues but a short time; the latter arises from a condensation of texture, analogous to that which takes place in severe burns; it commences when the former ceases, and scarcely any force which the patient can bear is capable of overcoming it. This condensation of the muscular fibre is produced by two different causes. The first of these is the inflammation, which always attends injuries of this kind, and which is greatly augmented by the splints, bandages, &c, which are generally applied immediately after the injury. Inflammation is known to have the same effect upon other textures. For instance, when it takes place in the cellular substance, it becomes almost obliterated, and the skin, after severe burns, frequently contracts so as to cause serious deformities. The second, but not the least active cause, in producing this state of the muscles, is the practice of confining them by permanent extension bandages, and improper splints; for whenever an organ is prevented from performing its natural functions, it parts with the vital properties which it before possessed, and becomes partially disorganized. An artery, when the vital current has ceased to course through it, degenerates into a ligamentary substance, and loses all its former elasticity which was so essential to the due performance of its functions. Consequently, the more closely a muscle is confined either by fixing the limb permanently in one position, by the pressure of bandages applied next the limb, or by long continued and powerful extension, the more sure it will be to take on this kind of condensation, and the more obstinate and irresistible



it will be. The shortening which arises from this condensation of texture, no force which the patient can bear is capable of overcoming. For the first ten or twelve days the extending power appears to be answering the purpose intended; but it is this very extension which ultimately assists to destroy the vital character of the muscles, causes them to become condensed in texture, and to part with their peculiar mobility. Alternate relaxation, and tension are so essential to a muscle, that whenever they are suspended for any considerable length of time, it loses its natural properties, and becomes gradually assimilated to the nature of the tendon which is appended to it.

Why is there no shortening of the limb in cases of fractured humerus? I answer it is the absence of all the causes mentioned above. Permanent extension is not resorted to in these cases; the limb below the elbow is left unconfined, the patient moves about his arm swinging by his side, the fore-arm is at liberty to be either flexed or extended, and the muscles being in this way a little exercised from time to time, do not part with their natural habitudes.

The indications then, in every case of fracture, especially those of the leg and thigh, are in the first place, to place the fractured bones as near as possible in a perfect state of coaptation, and the limb in a natural and easy position, which during this stage of the injury, is to be kept constantly wet with spirit or spirit and water, at the same time making use of every other means within our power to subdue the inflammation, and avoiding everything which is calculated to heighten, or excite it. While the inflammation continues, all motion is to be avoided as much as possible. In fractures of the thigh, the limb may be laid over the double inclined plane of C. Bell. In those of the

leg below the knee, the injured limb may be bedded securely on pillows, the knee being flexed almost at right angles, and the leg laid upon its outside, making no attempts in either case, at forcibly retaining the broken bones in a perfect state of coaptation until the inflammation has subsided, when, if they are not found so, they may be easily placed in that situation, and so retained without the danger of producing a greater evil than that which we are attempting to remedy. In cases of fracture of the arm and fore-arm where there is not much injury of the soft parts, and the injury is not of such a nature as to render it necessary for the patient to keep his bed, the splints may be applied immediately after the injury, care being taken not to apply the dressings too tight. The splints ought to be so constructed as to press equally on every part of the limb with which they come in contact, and to give such a support, that the limb may be flexed and extended, and otherwise exercised from time to time without danger of displacing the broken bones.

The splints which I now offer to the medical public, and for which I have obtained a patent, are formed upon the above plan; they are, furthermore, composed of a material of much firmness and strength, and possessing at the same time, the all-important property of being capable, simply by the application of heat, of being moulded into any form required, so as even to conform to the slightest elevations, and depressions as perfectly as would a cast of gypsum or clay.

The splints for the arm, fore-arm and thigh are left in plain sheets to be moulded to the limbs, when wanted for use. The splint for the leg below the knee, is formed on a block representing rather more than a vertical half of the leg and foot from the knee to the ends of the toes. Connected with this



by means of straps and buckles, is a counter splint to be applied to the inside of the leg, just below the knee, and is only to be used in cases of oblique fractures, and in connexion with the apparatus for fractured thigh.

The apparatus for fractured thigh consists of three splints, all composed of the material alluded to above. The upper one is a broad sheet, long enough to extend from the great trochanter to the knee, and wide enough when bent, to fit the outside of the thigh, and envelope rather more than half its circumference. This splint is cut tapering at its upper extremity, to which are attached two straps, and directly opposite to these two buckles. This splint is connected to another below it, fitted to the outside half of the leg and foot, (the same as that used for fractures of the leg below the knee), by a joint, the two arms of which move in two corresponding sheaths, one of which is fixed to the lower end of the thigh splint, and the other to the upper end of the leg splint, these arms are fixed in their places by screws, so that the apparatus may be taken apart at the knee, or lengthened or shortened at pleasure to suit the length of the limb. The accompanying plates will supersede the necessity of a more minute description.

The advantages which these splints possess over all others, are, that in a few minutes they can be accurately moulded to any limb of whatever form or size. That by pressing equally on every part, enveloping rather more than half the circumference of the limb, and extending its whole length, they afford a support which can be obtained in no other way. So perfect is the support afforded, that the limb may be considerably exercised from day to day by alternately flexing and extending it, without the least danger of displacing the broken bones; and in



this manner we are enabled to guard against that kind of muscular contraction, alluded to above, which consists in a gradual condensation of texture, and which I consider to be the cause of the permanent shortening of the limb. In cases of fracture below the knee, the patient can sit up after the splint is applied, and even walk about with the assistance of crutches.

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#### DIRECTIONS FOR APPLYING THE SPLINTS.

Having wrapped the limb in a piece of fine cotton cloth, hold the splint which you intend to use before a hot fire until it becomes soft and flexible. Then, while warm, apply it to the limb, pressing it snugly to it with your hands, until it takes its form, and is accurately adapted to every part with which it is intended to come in contact. Then apply a circular bandage snugly round the whole from one end of the splint to the other.

*The splint for fractures of the arm above the elbow*, is to be applied to the back side of the arm as it hangs perpendicularly by the side of the body.

*The splint for the fore-arm* is to be applied to the outside of the arm and hand when the elbow is bent at a right angle, and the palm of the hand is turned towards the body. The arm must then be suspended in a sling.

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#### DIRECTIONS FOR USING THE APPARATUS FOR FRACTURED THIGH.

Fit the *leg-splint* to the outside of the leg and foot, and the *counter-splint* to the inside of the leg, where the tibia swells to form a part of the knee-joint, bringing the upper end of it exactly level with the top of the tibia ; then remove and line them

with some soft material, re-apply and connect the *counter-splint* with its opposite by means of the straps and buckles, and apply a bandage round the whole from the knee to the ends of the toes. Fit the *thigh-splint* to the outside of the thigh, bringing the end to which the long straps are attached exactly to the top of the thigh-bone, or which is the same thing, to the point of the process called the great trochanter. Then remove and line it with some soft material. Introduce one arm of the joint (which you are supposed previously to have removed for the better convenience of fitting the splint) into the sheath made to receive it at the lower end of the thigh-splint, and then connect it with the *leg-splint*, slipping the other arm of the joint into the sheath made to receive it there. Then bring the *thigh-splint* to its former situation; bring the strap, which is attached obliquely, up through the groin, and the other round the pelvis, and connect them with their corresponding buckles. Then buckle the short straps which pass round the thigh. During this process the limb must be kept extended. While this extension is continued, the screws are to be introduced and turned firmly down, so as to prevent all motion between the arms of the joints and their sheaths. The extension made use of ought in no case to be more than is just sufficient to bring the broken ends of the bones into a state of apposition. The muscles ought in no case to be put upon a painful stretch or extended beyond their natural length. The bandaging is then to be continued from the knee to the groin, and a few turns passed round the pelvis. The limb is then to be kept in an easy state of flexion, either by placing it over the double inclined plane of C. Bell, or by properly supporting it with pillows placed under the ham. No bandage is in any case to be applied next the



limb. The limb during the cure must not be kept constantly in one position ; at one time it may be bent almost at right angles ; at another, laid straight ; and the limb ought to be considerably exercised from day to day by flexing, and extending it. The double inclined plane of Bell ought to be constructed with a hinge, made of leather or iron, at the point where the two planes meet, so that the apparatus can be easily flexed or extended. It may be fixed at the point of flexion required, by a strap or narrow piece of board, passing from the lower part of one of the planes to the other, and secured by a moveable pin at one end.

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Boston, March 9, 1831.

The Splints composed of Felt, which have been invented by Dr Smith, of Sutton, I have been in the habit of using in cases of fractures for some time back, and so far as my experience has gone, they form a valuable addition to the apparatus for the treatment of these injuries.

JOHN C. WARREN.

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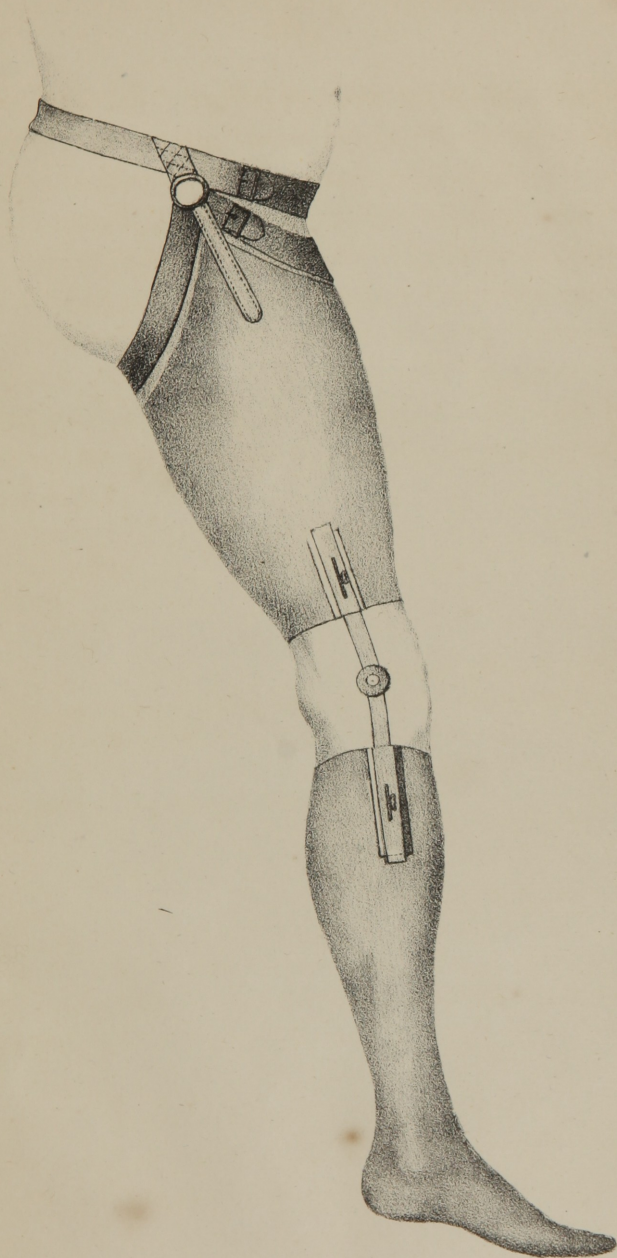
Boston, March 9, 1831.

The subscriber is in the habit of employing, occasionally, the Felt Splints invented by Dr Smith, of Sutton, and can with confidence recommend them as important auxiliaries to the means already possessed for the treatment of fractures.

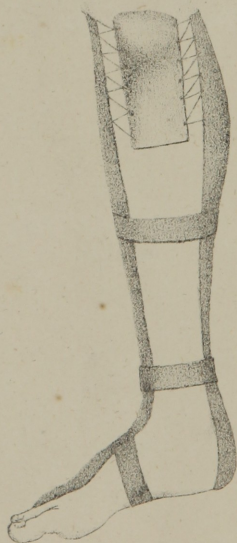
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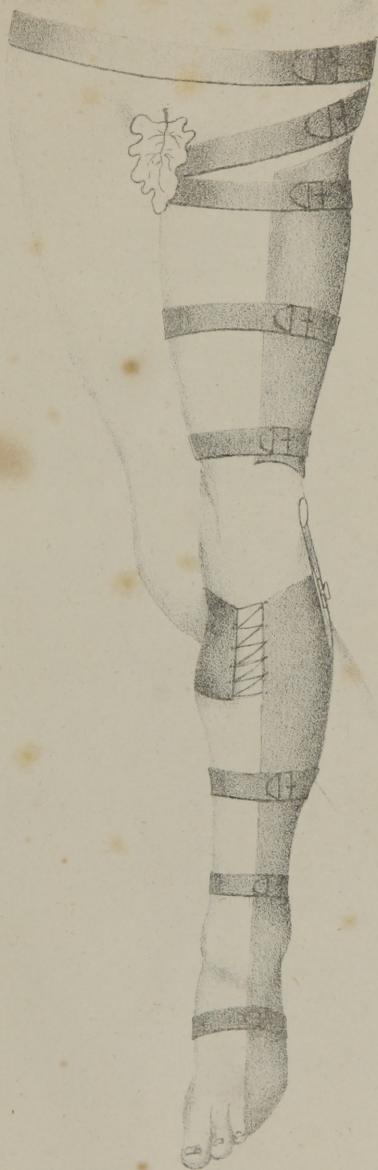




NICHOLS,  
Windsor, 1829











Dr J. C. Hall

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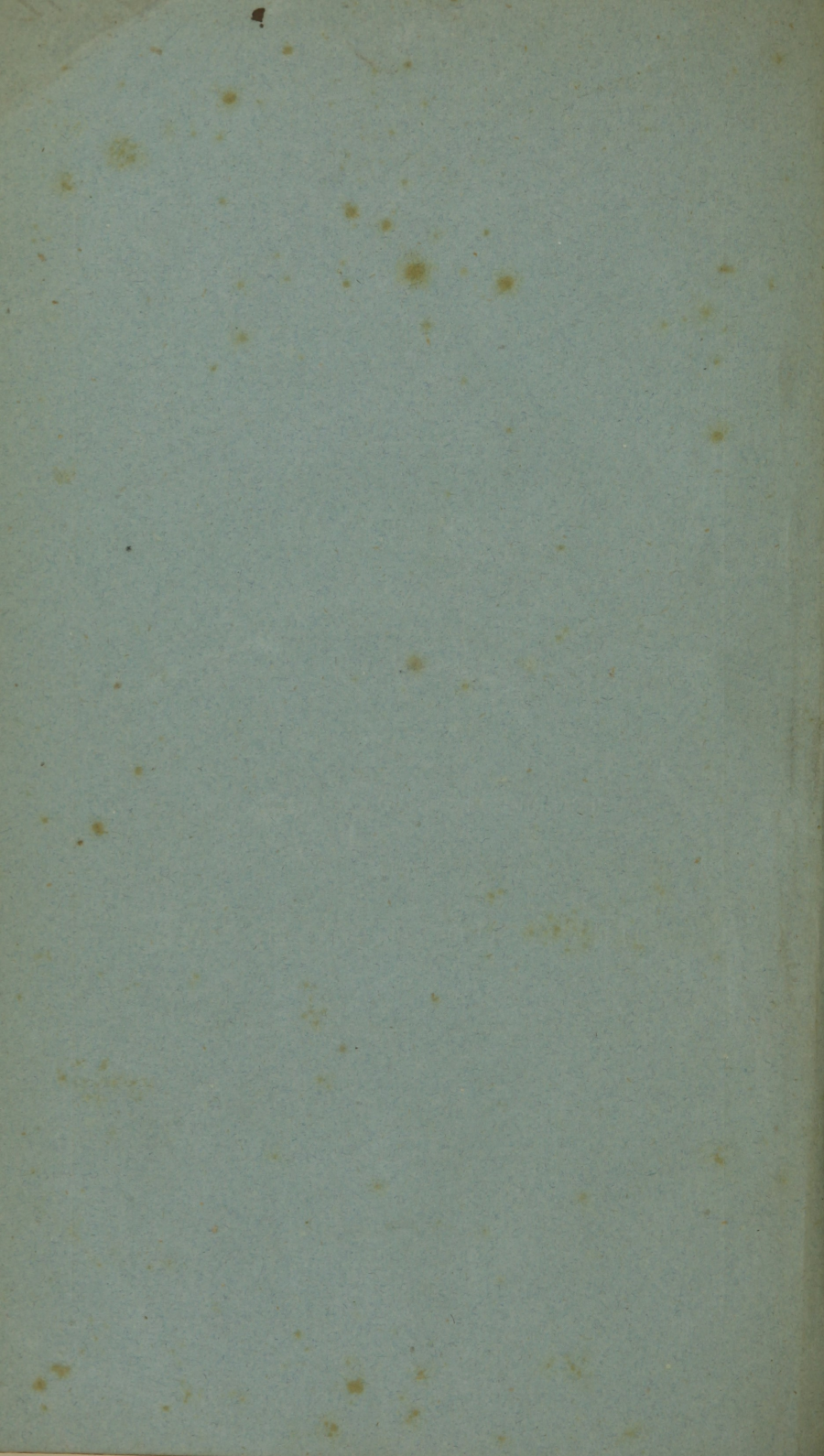
W I T H A

DESCRIPTION AND MODE OF APPLICATION

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